OBSERVATIONS ON THE FORMATION OF ALGAL PAPER

By John W. Harshberger

A few years ago my attention was called to a felted mass of material collected in several places in eastern Pennsylvania on the margins of ponds, lakes, and reservoirs, as well as on Lake Champlain. A microscopic study of this material showed me that it comprised the matted remains of green algae and diatoms that had been blown together by the wind, and later dried, so as to form sheets of paper. The notes below give the results of my investigation.

Samples of pond paper were submitted to me by Dr. G. F. Gilbert, of Honey Brook, Pa., where it was formed in the reservoir of that place, and by Miss Elizabeth Woolman, of Lansdowne, Pa. The paper from Honey Brook was formed by the matting together of oak leaves, some pretty well decomposed, others dry, brown and firm, and matted filaments of *Oedogonium* sp., with numerous detached oögonia and oöspores, *Diatoma vulgaris*, *Bumilleria* sp., *Tabellaria floccosa*, *Tribonema bombycinum*, *T. bombycinum* forma *minus* and *Euastrum simplex*.

The felt submitted by Miss Woolman (now Mrs. Aldrich Pennock) was much finer in texture and more uniform in appearance. It consisted of an almost pure mass of the filaments of *Oedogonium fragile*. None of the filaments of this mass were in the fruiting condition, nor were the cells so badly collapsed.

An asbestos-like felt was received from Dr. Charles H. Frazer from W. C. Richardson, collected at Essex, Lake Champlain, in June, 1904. This asbestos-like felt was found to consist of frustules of a *Navicula*, the species of which I have been unable to determine. In addition to *Navicula*, I found a few disjointed segments of *Tabellaria floccosa*, together with a few filaments of an undetermined alga which assisted in the formation of the felted mass.

Through the courtesy of Dr. Adolph W. Miller, I received some algal felt from Dr. H. M. Freas, of Philadelphia, gathered

by him in Gustine Lake, Fairmount Park. Upon examination, this proved to consist of almost pure felted masses of *Tribonema bombycinum.*

Having determined the plants which enter into the composition of the algal paper mentioned above, it is important to describe the method of its formation. All of the forms of algae mentioned above are free-floating kinds ordinarily described as freshwater plankton. When floating on the surface, such plants are driven about by the wind that blows over the surface of the lake or pond. Smaller masses of floating algae are blown together until large mats are formed, in which dead leaves and other material may be incorporated, and these mats may be blown to the shore and anchored by drifting into shallow water. If such rafts of material occur in a reservoir, as at Honey Brook, the drawing off of the water would cause the stranding of the rafts. The water held in suspension in the interstices of the filaments evaporates and the cells dry up and extensive sheets of algal paper are thus formed. In the case of algal rafts stranded on the shores of ponds and lakes, the advent of hot weather and the lowering of the general level of the water by evaporation would cause in a similar manner the formation of the algal paper, or felt.

The composition of this paper depends on the algae which are present in the pond when the formation of the paper begins. The paper may consist entirely of one plant, as in the diatomaceous and oedogonial papers, or in a mixture of a number of diverse types of green algae with diatomaceous frustules and the remains of leaves blown into the pond from bordering forest trees.

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SHORTER NOTES

THE TAXONOMY OF A LEAF-SPOT FUNGUS OF THE APPLE AND OTHER FRUIT-TREES. — The "brown-spot" disease of apple leaves was doubtfully attributed to the fungus *Phyllosticta pirina* Sacc. by Alwood * in 1892. The same fungus occurs on the leaves of pear, quince, and plum, and the disease is known by the name of "leaf-spot," "frog-eye," etc.

* Alwood, W. B. Va. Agr. Exp. Sta. Bull. 17 : 62. 1892.